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Monthly Report on the Nuclear Fuel Market

NUEXCO

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MONTHLY REPORT ON THE NUCLEAR FUEL MARKET

March 1984 No. 187

R. WESLEY MILLER, *EDITOR* JAMES J. LIGHTNER, *ASSOCIATE EDITOR*

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To Our Readers

Please note that the address of Nuexco's office in Atlanta, Georgia has been changed from Suite 500, Seven Piedmont Center to Suite 905, Ten Piedmont Center. Phone, telex and telecopy numbers are unchanged. The complete address now is:

Suite 905
Ten Piedmont Center
Atlanta, Georgia 30305.

* * *

Nuexco will host a hospitality suite during the Atomic Industrial Forum's Fuel Cycle Conference in Atlanta, April 1–4. The suite will be located in the Peachtree Plaza Hotel. We look forward to seeing you there.

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PRICING

NATURAL URANIUM AND CONVERSION

The **Exchange Value** as of February 29, 1984 is **$17.50** per pound U_3O_8, down $3.00 since last month. The *Current Market Data* section of this Report lists four uranium sales transactions, involving a total of approximately 2.0 million pounds U_3O_8 *equivalent*. Two of those transactions were near-term sales of concentrates for prices well below the previous month's Exchange Value; one was a near-term sale completed in December, and one involved long-term deliveries of natural UF_6.

Active supply of uranium (U_3O_8 and UF_6) for spot and near-term delivery totals **5.9 million** pounds U_3O_8 or equivalent UF_6. The corresponding figure for **active demand** is **1.3 million** pounds. The spot and near-term **supply-demand ratio** fell to **4.5:1**, as buyer interest increased with the fall in offering prices.

The **Transaction Value** as of February 29, 1984 is **$22.50** per pound U_3O_8, down $0.55 since last month. The current Transaction Value includes 13 transactions involving a total of 2.0 million pounds U_3O_8 or equivalent UF_6 and covers a period of 7 months.

The **Loan Use Charge Rate** as of February 29, 1984 is **6 percent** per annum, unchanged since last month. No uranium loans are reported.

* * *

The uranium market price structure came under severe pressure during February as several active sellers, suspecting a sustained price decline, scrambled to complete sales. Both producers and inventory holders made offers well below the January 31 Exchange Value. Since very few buyers have unfilled requirements for which they need to purchase in the near term, virtually all spot and near-term uranium demand is discretionary. Therefore, transactions have been concluded only when potential buyers have considered sellers' offers extremely attractive. The sharp decline in offering prices did elicit greater buyer interest, as active near-term uranium demand more than doubled from the level of the previous month.

The current price decline does have momentum. A large amount of inventory has entered the market recently and more is expected in the near future. Prices could move much lower in the coming weeks if sellers continue to compete aggressively for the limited sales opportunities.

The current erosion of spot and near-term prices actually began in the third quarter of 1983, but there was then a hope among sellers that the decline would be contained at around the $20 level. Recent setbacks to nuclear power in the USA have dramatically influenced the market and perceptions about it.

1. In mid-January the US Nuclear Regulatory Commission (NRC) refused Commonwealth Edison a license to operate its Byron Unit 1. The unit had been essentially completed, at a cost of some $3.7 billion. The NRC action was as disturbing as it was unanticipated, especially because Commonwealth Edison has long been regarded as one of the world's most effective constructors and operators of nuclear power plants.

2. Only three days later, Public Service Company of Indiana announced the cancellation of its Marble Hill plant. The two-unit, 2,260-MWe plant had been approximately half completed, at a cost of approximately $2.5 billion. Two other nuclear units had been cancelled within a month before the Marble Hill cancellation, Carolina Power and Light's Harris Unit 2 and Gulf States Utilities' River Bend Unit 1.

3. Soon after the cancellation of Marble Hill, Cincinnati Gas and Electric announced plans to convert its nearly completed Zimmer nuclear unit to a coal-fired plant.

4. The already difficult financial conditions of several nuclear utilities recently have worsened. Those financial pressures have forced some to consider the cancellation of nuclear units under construction. For example, pressure from a public utility commission led Philadelphia Electric late in January to halt construction for 18 months on Limerick Unit 1. Long Island Lighting Company has faced a string of expensive obstacles to completion of its Shoreham unit.

5. On January 18 DOE announced its new Utility Services enrichment contract (USEC), which removed from the market millions of pounds of artificial demand that had been created by enrichment contracts based on overoptimistic forecasts of actual reactor needs. Thus, the USEC enabled utilities substantially to reduce their estimates of long-term uranium demand (unfilled requirements).

All of these events have eliminated, reduced or delayed uranium demand. The prospect of additional inventory selling combined with a further reduction and delay in demand is a prescription for extreme market disruption.

* * *

The **Conversion Value** as of February 29, 1984 is **$0.30** per pound U as UF_6, down $0.30 since last month. This Report lists one conversion transaction, involving 101–300 thousand pounds U as UF_6 sold for a price equivalent to the current Conversion Value. Active secondary market supply of conversion services for delivery within three years totals 3.1 million pounds U as UF_6, more than

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twenty times the corresponding demand figure.

Activity in the secondary conversion market increased during February over the scant level in January. Some sellers of natural UF_6 offered to swap for U_3O_8 at prices equivalent to minimal compensation for the conversion component of the UF_6. The few buyers with small needs for conversion services showed fresh interest in the low prices available. Two other secondary market conversion transactions were in negotiation as this Report went to press, and could be concluded in March.

SECONDARY MARKET ENRICHMENT SERVICES

The secondary market **SWU Values** as of February 29, 1984 are **$100** for **DOE origin** and FY84 delivery, down $5 since last month, and **$83** for **non-DOE origin** and delivery within 15 months, down $2 since last month. The *Current Market Data* section of this Report lists eight SWU transactions involving a total of approximately 500 thousand SWUs, approximately 80 percent of which are for FY84 deliveries. Active secondary market supply of enrichment services totals approximately 900 thousand SWUs, and active demand amounts to approximately 300 thousand SWUs.

* * *

The DOE origin SWU Value declined $5 this month as sellers of FY84 SWUs lowered their offering prices in competition for the few remaining buyers of FY84 SWUs. Activity in the secondary market for DOE origin SWUs, while greater in February than in January, has not yet reached the level anticipated once many utilities formally decide to convert to the USEC, which enables former holders of Requirements contracts to purchase up to 30 percent of their requirements in the secondary market for DOE origin SWUs.

The current demand for FY84 SWUs is limited to the few Requirements contract holders that have decided to convert to the USEC, and to any holders of modified ISCs (Interim Sales Contracts) that have not yet completed purchases for FY84. The market for FY84 SWUs will expire in March due to DOE's 180-day notice period for SWU deliveries; DOE FY85 begins on October 1, 1984.

Utility demand for non-DOE origin SWUs has changed over the past two months, as the 3.5-year Requirements contract holders that had furnished almost all of the demand for non-DOE SWUs either have completed their purchases or have withdrawn from the market to examine the terms of the USEC. As sellers of DOE origin SWUs reduced their offering prices in February, offering prices for SWUs of non-DOE origin also fell to remain competitive.

SECONDARY MARKET ENRICHMENT SERVICES: 1983 REVIEW

Introduction

During 1982 the secondary SWU market had become an integral part of many utilities' overall fuel procurement strategies, and by early 1983 the market was truly international. Nevertheless, during 1983 the secondary SWU market experienced several periods of uncertainty associated with attempts by the US Department of Energy (DOE) to establish policies that would secure its majority share of the international uranium enrichment business. Each such attempt by DOE was followed by rapid adjustments in the market. The last such DOE announcement, made at the beginning of 1984, was a new enrichment contract that effectively institutionalizes the secondary market, but attempts to confine activity in it to SWUs of DOE origin for the next few years.

Secondary Market Development

The factors that have driven the secondary market for enrichment services are the same as those that have driven the U_3O_8 and conversion markets. Overly optimistic demand projections, reactor cancellations and deferrals, inflexible contracts made too far in advance of need, inventory accumulations, and high carrying costs all have combined to produce in many market participants a strong desire to sell excessive inventories and unwanted obligations. The primary potential sellers have been of two classes:

1. Holders of Adjustable Fixed-commitment (AFC) enrichment contracts having excessive or unwanted commitments to DOE;

2. Holders of large inventories, or commitments to take future deliveries, of unwanted non-DOE origin SWUs.

During 1983 many secondary market sellers were willing to accept substantial real losses in return for the benefits of cash inflow and relief from commitments. Sellers'

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offering prices declined to a level at which it was profitable for holders of Requirements contracts having 3.5-year termination provisions to use SWUs purchased in the secondary market to replace existing near-term commitments. Other secondary market SWU buyers included 3.5-year Requirements contract holders that had accepted DOE's offer of the modified ISC, plus various contract holders needing small spot and near-term deliveries to supplement existing commitments.

Pricing Trends

Table 1 shows the Nuexco SWU Values for each month of 1983 beginning with February 28, when the SWU Value was introduced. During the first quarter of the year much of the existing demand was for FY83 SWUs, and the most competitive prices were offered by non-DOE sellers. The most competitive DOE origin offers were discounts of approximately $25 off the AFC price of $138.65, while non-DOE sellers offered the equivalent of as much as $35 below the AFC price. Sellers' offers for FY84 SWUs of all origins were in the range of $110 throughout the first quarter.

Table 1

1983 SWU VALUES

Determined as of the Last Day of Month	Report Number	SWU Values (FY83)	SWU Values (FY84)
Jan	174	—	—
Feb[1]	175	$103	$110
Mar	176	$106	$110
Apr	177	$103	$109
May	178	—	$103
Jun	179	—	$103
Jul	180	—	$95
Aug	181	—	$95
Sep	182	—	$90
		DOE origin (FY84 delivery)	**Non-DOE origin (delivery within 15 months)**
Oct[2]	183	$115	$85
Nov	184	$110	$90
Dec	185	$105	$85

[1]Nuexco introduced the SWU Value on February 28, 1983.
[2]On October 31, 1983 Nuexco began publishing one SWU Value for DOE origin SWUs and one for non-DOE origin SWUs, to reflect the two-tiered price structure of the secondary SWU market.

The demand for FY83 SWUs had been exhausted by the second quarter of 1983. During the second quarter, competition among sellers to complete FY84 sales led sellers of non-DOE origin SWUs to undercut prices offered by DOE origin sellers. Because of many utilities' preference for SWUs of DOE origin, a price incentive in the range of $5-10 became necessary to induce many potential buyers to purchase SWUs of non-DOE origin. The break-even price for 3.5-year Requirements contract holders considering termination for secondary market participation was approximately $112. Some sellers of DOE origin SWUs were offering at prices as low as $109, so non-DOE origin sellers dropped their offering prices for FY84 SWUs to approximately $103 during May and June.

DOE's concern about the secondary SWU market had been mounting since early 1982, when sellers of non-DOE origin SWUs had begun to penetrate the US market successfully. In August 1982 DOE issued the draft form of the proposed Facility Requirements (FR) contract. Utilities, however, overwhelmingly rejected the FR contract draft. Throughout the first half of 1983 they awaited the issuance of the final FR contract. The expectation of the final contract led most potential sellers of DOE origin SWUs for delivery after FY84 to withdraw from the market until the terms of the new contract could be examined. However, DOE never issued a final version of the FR contract. Instead, in mid-1983 DOE announced that another contract, the Utility Services enrichment contract (USEC), would take the place of the FR contract and would be issued within the coming months.

ISC Offer

DOE also announced, on July 25, 1983, the terms of a new contract available exclusively to holders of 3.5-year Requirements contracts, a class of customers that furnished almost all of the demand for non-DOE origin SWUs in the secondary market. That new contract, the Interim Sales Contract (ISC), offered 3.5-year Requirements contract holders a SWU price equal to that which AFC contract holders paid ($11.20 less than the current Requirements price), in exchange for an agreement not to terminate any contracted SWU deliveries for FY84-85.

The effect of the ISC was to cut the break-even price for potential secondary market participants by $11.20 (to approximately $101), forcing secondary market sellers also to cut their offering prices by that amount if they desired

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to remain competitive. In late July and August DOE origin sellers' offering prices fell to the range of $100, and non-DOE sellers' offers fell to approximately $95. Offering prices declined even further, to approximately $90 for non-DOE origin SWUs, during September.

The ISC failed to interest the 3.5-year Requirements contract holders, and because of secondary market sellers' persistent competitiveness DOE continued to lose business. On October 18 DOE announced modifications to the ISC intended to make it a more attractive offering. The two principle modifications were the following provisions:

1. The customer could obtain in the secondary market *without termination charges* up to 40 percent of requirements for FY84 and 60 percent for FY85, provided that both buyer and seller certify in writing that the secondary market SWUs were of *DOE origin.*

2. The customer, upon choosing to accept the modified ISC, would agree to convert to the USEC when it was issued, provided that its terms were "no less favorable than those in the customer's existing Requirements-type contract when considered in its entirety."

Two-tiered Price Structure

The immediate effect of the modified ISC was to raise the value of DOE origin SWUs in the secondary market and to decrease the value of non-DOE origin SWUs, thereby creating a two-tiered secondary market price structure. The SWU Values as of October 31 were $115 for DOE origin and $85 for non-DOE origin. Because any signers of the modified ISC would be able to accept only SWUs of DOE origin, DOE origin sellers were able to increase their offering prices by approximately $20. Non-DOE origin sellers lowered their offering prices by $5–10 in order to induce potential signers not to accept the contract offer. Customers choosing not to sign the modified ISC would purchase non-DOE origin SWUs because of the high cost of DOE origin SWUs.

In the weeks immediately following modification of the ISC, few potential signers showed much interest in the contract. As a result, DOE origin sellers lowered their offering prices to approximately $110 in November. The main reasons for the lack of interest were:

1. uncertainty about the contract's provision requiring conversion to the USEC upon its issuance;

2. the willingness of non-DOE sellers to make offers that were extremely attractive despite the existence of the modified ISC.

In November DOE clarified the terms of the contract to establish that the *customer* would decide if the USEC were no less favorable than the customer's existing Requirements contract. Following that clarification, interest in the modified ISC increased, and a small number of utilities signed the contract during November and December. The DOE origin SWU Value decreased to $105 in December, however, because of competition among sellers for the limited demand created by the few signers of the modified ISC.

USEC Issuance

DOE withdrew the modified ISC offer on December 30, 1983 when it issued the draft of the USEC. DOE issued the final USEC on January 18, 1984. During January most participants withdrew from the secondary SWU market in order to examine the terms of the USEC. The two-tiered price structure persisted, however, because of the presence of buyers seeking exclusively DOE origin SWUs and because of the continued presence of potential buyers of non-DOE origin SWUs. The SWU Values as of December 31 were $105 for DOE origin SWUs and $85 for non-DOE origin SWUs.

The current USEC SWU price ceiling of $135 is well below the Requirements contract ceiling price and $3.65 less than the AFC price. The relatively low SWU price is one inducement to DOE's existing customers to convert to the contract. The USEC also contains three provisions that have strong implications for the near-term secondary SWU market.

1. Former holders of all Requirements contracts may substitute at no charge DOE origin SWUs acquired in the secondary market for up to 30 percent of reactor requirements for FY84-86 deliveries. This provision will help to promote an active secondary market for DOE origin SWUs.

2. Former holders of AFC contracts must take all of their Appendix A obligations for FY84. They may reduce their FY85 obligations by up to 10 percent, and their FY86 obligations by up to 25 percent, provided the reductions do not cause them to take less than 70 percent of reactor requirements. These provisions are likely to sustain the secondary market supply of DOE origin SWUs at least through FY85. The market for FY84 SWUs will end within the month of March, as DOE's 180-day notice period will become limiting. (DOE FY85 begins on October 1, 1984.)

3. USEC customers may purchase non-DOE SWUs in FY87 and beyond to fill the portion of requirements not purchased from DOE. Demand for DOE origin SWUs on the secondary market could decline markedly in that period.

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1983 SWU Transactions

Table 2 lists data regarding secondary market SWU transactions of which Nuexco is aware and possesses sufficiently complete data for purposes of analysis. A total of approximately 6.8 million SWUs were sold in 50 transactions. (There are five other 1983 SWU transactions of which Nuexco is aware, but regarding which Nuexco does not have complete information.) Approximately half of those 50 transactions involved DOE origin SWUs and half involved non-DOE origin SWUs. While 30 percent (15) of the total number of transactions involved FY83 deliveries, the quantity of SWUs involved in those transactions, 1.1 million, was only 16 percent of the total quantity. While 40 percent (20) of the transactions involved FY84 deliveries, the number of FY84 SWUs sold (2.0 million) amounted to only 30 percent of the total. The 36 percent (18) of transactions involving deliveries in FY85 and beyond accounted for 54 percent (3.7 million) of the total quantity of SWUs sold, mainly because of secondary market sales that entailed multiple annual deliveries. Three of the 50 SWU sales involved deliveries of SWUs for more than one fiscal year prior to FY86.

Table 2

1983 SECONDARY MARKET SWU TRANSACTIONS[1]

Delivery Period	Number of Transactions	Millions of of SWUs
FY83	15	1.1
FY84	20	2.0
FY85 and beyond	18	3.7
All[2]	50[3]	6.8

[1] Does not include transactions for which Nuexco has incomplete data. Nuexco began publishing recent SWU transactions in Report 179 of July 1983.

[2] Approximately 50 percent of all transactions involved non-DOE origin SWUs, while the other 50 percent involved SWUs of DOE origin.

[3] Note that three transactions involved deliveries in more than one of the three delivery period categories.

AMPLIFICATION OF DOE SWU CONTRACT PRICE CEILING ESCALATION TERMS

The article entitled "USEC and Requirements Contracts: Comparison of Price Ceiling Escalation Terms," in the *Pricing* section of last month's Report (Number 186), compares the price ceiling terms of the USEC to those of Requirements contracts. While the article was correct as written, it may have given a misleading impression of the relative effect of future energy cost escalation on the ceiling price of each contract.

The most recent Requirements contract ceiling price of $151.93 consists of $123.46 (81 percent) for the escalated power costs, $18.47 (12 percent) for escalated labor costs, and $10.00 for the unescalated portion. Thus, if the cost of power alone were to increase by 10 percent, the Requirements ceiling price would rise by 8.1 percent. By comparison, the current ceiling price under the Utility Services Enrichment Contract (USEC) consists of $67.50 (50 percent) for power rates (demand and energy rates) and $67.50 (50 percent) for general inflation (as measured by the GNPIPD); a 10-percent increase in power costs alone would cause the USEC ceiling price to rise by approximately 5 percent.

Some readers have observed that there is some potential for the Requirements contract ceiling price to be reduced relative to the USEC ceiling. As noted in the referenced article, DOE has stated that it intends to reduce or eliminate the demand charge for power not taken, which could in turn reduce the Requirements contract ceiling price from approximately $165 to as little as $135 in 1984. The likely form of this reduction for power not taken would be a reduction in the contracted power levels. This change would not reduce the USEC ceiling price, which is based on the demand charge *rate*, rather than on the demand charge itself.

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CURRENT MARKET DATA

EXCHANGE VALUE $17.50/lb. U_3O_8
Determined as of February 29, 1984

Definition

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

TRANSACTION VALUE[1]
Determined as of February 29, 1984

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
22.50	2.0	13	7

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in:

A. Transactions closed within the previous three-month period for which delivery was scheduled within one year of the transaction date;
B. At least ten transactions;
C. Transactions involving a sum total of at least two million pounds U_3O_8 equivalent.

The sample time is extended as necessary to include these minima. Other currencies are converted to US dollars as of the transaction date.

Comments

Nuexco does not consider the following in determining the Transaction Value:

A. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.
B. The price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of Exchange Value or any other independent variable.
C. Transactions in which the delivery price is defined in such a way that it cannot currently be determined.

[1]Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161. The corresponding data for 1982 are tabulated on page 5 of Report 173, and for 1983 on page 5 of Report 186.

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LOAN USE CHARGE RATE[1] 6%
Determined as of February 29, 1984

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

Derivation

Nuexco bases the Loan Use Charge Rate upon:

A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrows and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[1]Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162. Monthly data for 1982 appear on page 2 of Report 173.

CONVERSION VALUE $0.30/lb. U as UF_6
Determined as of February 29, 1984

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

Derivation

Nuexco bases the Conversion Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:

A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.
C. Transportation charges other than those customarily provided by primary suppliers of conversion services.

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CURRENT MARKET DATA

SWU VALUES

$100/SWU FOR DOE ORIGIN AND FY84 DELIVERY
$83/SWU FOR NON-DOE ORIGIN AND DELIVERY WITHIN 15 MONTHS
Determined as of February 29, 1984

Definition

The SWU (Separative Work Unit) Values represent Nuexco's judgment of the price, expressed in US dollars per SWU, at which transactions for the sale of significant quantities of SWUs of stated origin for delivery in the specified time period could be concluded as of the date indicated.

Derivation

Nuexco bases the SWU Values upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.
E. SWU prices at varying tails assays and varying product assays are converted to the equivalent SWU price at the DOE Reference Transaction Tails Assay (presently 0.20 weight percent U_{235}) and a product assay of 3.0 weight percent U_{235} assuming feed costs calculated using the Nuexco Exchange Value and Nuexco Conversion Value determined as of the last day of the same month.

Comments

Nuexco does not consider the following in determining the SWU Values:

A. The price of SWUs delivered under long-term contracts from primary suppliers, such as DOE, Urenco, or Eurodif.
B. The price of SWUs delivered under other than arm's length transactions.

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EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (Feb. 29, 1984)	Last Month (Jan. 31, 1984)	12 Months Ago (Feb. 28, 1983)	This Month (Feb. 29, 1984)	Last Month (Jan. 31, 1984)	12 Months Ago (Feb. 28, 1983)
Australia (dollar)	18.54	22.33	22.63	48.20	58.06	58.83
Belgium (comm. franc)	933	1,177	1,031	2,426	3,061	2,680
Canada (dollar)	21.89	25.60	26.70	56.91	66.54	69.42
Finland (markka)	98.65	121.81	116.94	256.46	316.67	304.01
France (franc)	140.00	176.42	148.87	363.97	458.65	387.03
FRG (mark)	45.50	57.65	52.41	118.29	149.87	136.25
Italy (lira)	28,262	35,121	30,208	73,476	91,306	78,535
Japan (yen)	4,084	4,809	5,106	10,618	12,502	13,274
Netherlands (guilder)	51.33	64.83	57.97	133.46	168.55	150.71
South Africa (rand)	21.02	25.98	23.45	54.65	67.55	60.95
Spain (peseta)	2,611	3,250	2,825	6,788	8,450	7,344
Sweden (krona)	135.98	167.76	161.23	353.50	436.13	419.16
Switzerland (franc)	37.82	45.97	44.09	98.33	119.52	114.63
UK (pound)	11.71	14.56	14.23	30.44	37.87	36.98
US (dollar)	17.50	20.50	21.75	45.50	53.30	56.55

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (Feb. 29, 1984)	Last Month (Jan. 31, 1984)	12 Months Ago (Feb. 28, 1983)	This Month (Feb. 29, 1984)	Last Month (Jan. 31, 1984)	12 Months Ago (Feb. 28, 1983)
Australia (dollar)	23.84	25.11	20.81	61.97	65.28	54.10
Belgium (comm. franc)	1,200	1,324	948	3,120	3,442	2,464
Canada (dollar)	28.15	28.78	24.55	73.17	74.82	63.84
Finland (markka)	126.83	136.96	107.53	329.73	356.06	279.55
France (franc)	180.00	198.36	136.89	467.96	515.70	355.89
FRG (mark)	58.50	64.82	48.19	152.09	168.52	125.29
Italy (lira)	36,337	39,489	27,778	94,469	102,664	72,216
Japan (yen)	5,251	5,407	4,695	13,651	14,057	12,206
Netherlands (guilder)	66.00	72.90	53.30	171.59	189.52	138.58
South Africa (rand)	27.03	29.21	21.56	70.26	75.95	56.05
Spain (peseta)	3,357	3,655	2,597	8,728	9,501	6,753
Sweden (krona)	174.83	188.63	148.26	454.51	490.38	385.44
Switzerland (franc)	48.63	51.69	40.54	126.42	134.39	105.40
UK (pound)	15.06	16.38	13.08	39.14	42.58	34.01
US (dollar)	22.50	23.05	20.00	58.50	59.92	52.00

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on February 29, 1984.

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CURRENT MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6 This Month (Feb. 29, 1984)	Last Month (Jan. 31, 1984)	12 Months Ago (Feb. 28, 1983)	per kg. U as UF_6 This Month (Feb. 29, 1984)	Last Month (Jan. 31, 1984)	12 Months Ago (Feb. 28, 1983)
Australia (dollar)	0.32	0.65	1.46	0.70	1.44	3.21
Belgium (comm. franc)	16.00	34.46	66.35	35.27	75.98	146.28
Canada (dollar)	0.38	0.75	1.72	0.83	1.65	3.79
Finland (markka)	1.69	3.57	7.53	3.73	7.86	16.59
France (franc)	2.40	5.16	9.58	5.29	11.38	21.13
FRG (mark)	0.78	1.69	3.37	1.72	3.72	7.44
Italy (lira)	484.50	1,028	1,944	1,068	2,266	4,287
Japan (yen)	70.01	140.75	328.64	154.35	310.29	724.52
Netherlands (guilder)	0.88	1.90	3.73	1.94	4.18	8.23
South Africa (rand)	0.36	0.76	1.51	0.79	1.68	3.33
Spain (peseta)	44.76	95.13	181.82	98.69	209.73	400.84
Sweden (krona)	2.33	4.91	10.38	5.14	10.82	22.88
Switzerland (franc)	0.65	1.35	2.84	1.43	2.97	6.26
UK (pound)	0.20	0.43	0.92	0.44	0.94	2.02
US (dollar)	0.30	0.60	1.40	0.66	1.32	3.09

SWU VALUES EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	DOE SWU FY84	Non-DOE SWU delivery w/in 15 mo.
Australia (dollar)	105.94	87.93
Belgium (comm. franc)	5,333	4,427
Canada (dollar)	125.09	103.83
Finland (markka)	563.70	467.87
France (franc)	800.00	664.00
FRG (mark)	260.01	215.81
Italy (lira)	61,499	134,044
Japan (yen)	23,337	19,370
Netherlands (guilder)	293.34	243.47
South Africa (rand)	120.12	99.70
Spain (peseta)	14,921	12,384
Sweden (krona)	777.00	644.91
Switzerland (franc)	216.12	179.38
UK (pound)	66.91	55.54
US (dollar)	100.00	83.00

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on February 29, 1984.

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RECENT TRANSACTIONS[1]

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
2712	1984	101-300	116	European Producer	US Producer	Took place December 1983.
2710	1984	101-300	105	US Producer	US Producer	
2708	1984	101-300	indeterminate	US Utility	US Utility	Price related to market.
2637	1987-92	1,001-1,500	indeterminate	Canadian Producer	US Utility	UF_6. Price related to market, subject to floor and ceiling.

Secondary Market Conversion Services

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller	Buyer
2686	1984	101-300	100	US Producer	US Utility

Secondary Market Enrichment Services

Nuexco Transaction Number	Delivery Period[2]	Approximate Quantity (thousands of SWUs)	Approximate Price[3] as Percent of Current SWU Value[4]	Tails Assay (Percent U_{235})	Seller Group	Buyer Group	SWU Origin	Remarks
2711	1984	less than 50	less than 106	unknown	US Utility	US Utility	DOE	
2709	1984	less than 50	106	0.3	US Utility	US Utility	DOE	
2698	1989	50-100	indeterminate	to be determined	European Entity	European Utility	Eurodif	Price subject to escalation indices.
2697	1984	101-300	less than 102	0.3	European Producer	US Utility	Eurodif	
2681	1984	less than 50	108	0.3	US Utility	US Utility	DOE	
2674	1984	less than 50	111	0.2	European Entity	US Utility	Eurodif	
2673	1984	less than 50	less than 133	0.25	European Entity	European Utility	DOE	
2635	1984-85	less than 50	indeterminate	0.2	US Utility	European Utility	DOE	AFC less discount.

[1]Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.
[2]Refers to calendar year, not fiscal year.
[3]Price is not normalized to 0.20% tails assay.
[4]Refers to SWU Value for same origin as SWUs included in transaction.

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CURRENT MARKET DATA

URANIUM SUPPLY
(As of 2/29/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
1575	—	500 per year	1985 on
1818	—	500 per year	1985 on
2038	1,000	—	UF_6
2134	—	250 per year	1984-87
2201	300	—	
2236	—	200 per year	1985-89
2246	100	—	
2263	—	500 per year	1985-90
2274	—	600 per year	1985-91
2275 A	110	—	
2297	—	200 per year	1985-89
2307	340	—	UF_6
2315	170	950	UF_6
2326	—	3,500	1988-91
2335	275	—	
2336	—	250 per year	1985 on
2365	20	—	
2366	400	—	
2368	—	2,500	
2376	100	—	
2389	300	—	
2390	100	—	
2392	35	—	UF_6
2403	1,100	—	UF_6
2421	100	—	
2429	450	—	
2436	850	—	enriched UF_6
2484	130	—	
TOTAL:	5,880		
INACTIVE			
0564	—	1,000 per year	1986-90
2017	1,100	1,200	
2191	125	—	UF_6
2193	—	800 per year	1986-90
2271	—	500 per year	1984-85
TOTAL:	1,225		

[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

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URANIUM DEMAND
(As of 2/29/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
2217	—	1,000 per year	1988 on
2302	—	330 per year	1988 on
2329	—	500	1985
2352	240	—	
2411	300	—	
2413	—	250 per year	1986 on
2445	—	250 per year	1988-93
2451	100	—	
2455	25	—	UF_6
2456	650	—	UF_6
TOTAL:	1,315		
INACTIVE			
1999	—	50 per year	1985-90
2118 A	250	—	
2244	—	750 per year	1987 on
2310 A	800	—	enriched UF_6
2372	—	150 per year	1985 on
2414	—	150 per year	1987 on, U_3O_8 or UF_6
2419	50	—	U_3O_8 or UF_6
TOTAL:	1,100		

[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

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CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND
(As of 2/29/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
1938	1,500	—	UF_6
2128	1,000	—	
2483	545	—	
TOTAL:	3,045		
INACTIVE			
2139	2,000	—	
TOTAL:	2,000		
Inquiries to Borrow:			
INACTIVE			
2118	250	—	U_3O_8 or UF_6
TOTAL:	250		

[1]Measured from the date of this Report.

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CONVERSION SUPPLY AND DEMAND
(As of 2/29/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF6) Within 3 Years	Beyond 3 Years	Remarks
Available for Sale:			
ACTIVE			
2051	1,500	—	
2141	1,500	—	
2438	125	—	1985-87
2464	10	—	
TOTAL:	3,135		
INACTIVE			
1936	1,500	—	
2230	300	—	
2401	600	—	
TOTAL:	2,400		
Inquiries to Purchase:			
ACTIVE			
2397	65	—	
2455 A	85	—	
TOTAL:	150		
INACTIVE			
2287	—	250 per year	1986 on
2295	200	—	
2372 A	—	250 per year	1985 on
2420	300	—	1986
TOTAL:	500		

[1]Measured from the date of this Report.

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CURRENT MARKET DATA

SWU SUPPLY
(As of 2/29/84)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
1895	—	500	
2040	55	—	
2052	245	350	
2100	—	100 per year	1984-89
2164	70	—	
2189	—	80	1985
2192	—	325	
2210	—	70	1985
2285	500	3,000	
2345	—	300	1985
2351	—	150 per year	1985-91
2378	—	120 per year	1985-88
2408	—	120	1985
2428	—	200	1985
2436 A	185	—	enriched UF_6
TOTAL:	870		
INACTIVE			
2337	250	250	
2359	180	—	
2375	200	—	
TOTAL:	630		

[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.

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SWU DEMAND
(As of 2/29/84)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
2142	—	50	1985-86
2346	—	100 per year	1985-90
2355	—	180 per year	1986,88,90,92
2382	—	80	1985-86
2400	55	85	1985
2404	40	—	
2405	70	—	
2407	—	200	1985-86
2412	—	80	1985
2422	—	2,000	1985-94
2430	120	—	
2447	—	30	1985
2448	30	50	1985-86
TOTAL:	315		
INACTIVE			
2237	—	250 per year	1987 on
2310	200	—	
2449	—	50	1986
2450	—	100	1987
TOTAL:	200		

[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.

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ANNUAL REVIEW

AUSTRALIA

Government Policy

The decisive federal election victory of the Australian Labor Party (ALP) in March 1983 marked the onset of a disappointing year for companies hoping to develop untapped Australian uranium properties. Although the ALP platform called for the cessation of uranium mining and the repudiation of existing contracts, party moderates pushed for a less drastic policy once in power. After several months of confusion and debate among factions of the ALP, the new government announced a uranium policy in November that forbids development of any planned uranium projects except for Olympic Dam in South Australia.

While the policy was bad news for most uranium miners in Australia, elements of pragmatism in it suggest that the government did not bind itself to a radical left-wing ideology.

1. The Prime Minister and his cabinet represent a center position in the ALP, and they made a concerted effort to formulate a policy that addresses the concerns of the public, the needs of the domestic economy, and the nation's reputation as a reliable trading partner.

2. With regard to the concerns of the public, the government established an inquiry by the Australian Science and Technology Council (ASTEC) entitled "Examination of the Issues Related to Australia's Role in the Nuclear Fuel Cycle." The inquiry is designed to provide an assessment of Australia's existing safeguards arrangements and other sensitive issues relating to the nuclear fuel cycle. The ASTEC report is scheduled to be concluded just before the ALP National Conference in July 1984. The results of the inquiry are likely to provide the basis for rational debate at the party conference over the existing uranium policy.

3. The approval of uranium mining at Olympic Dam in South Australia evidenced the government's recognition of the needs of the domestic economy. Copper and uranium exports from Olympic Dam could increase South Australia's export revenues by more than 50 percent, providing an important stimulus to that economically depressed region of the country. Public support for the Olympic Dam project within South Australia is strong, though fragmentary opposition from anti-uranium activists persists. In the view of Party leaders no other potential uranium projects have quite the significance to the national economy that Olympic Dam has. Moreover, after making a survey of the market for Australian uranium, the government decided that international demand was not sufficient to guarantee extensive sales by Australian producers within the decade.

4. The policy demonstrates a commitment to preserve Australia's reputation as a reliable trading partner by allowing the country's operating uranium mills, Ranger and Nabarlek, to continue production and export. Both operations have contracts committing approximately 90 percent of output for several years. Just before announcing the uranium policy, the government approved long-term export contracts between Energy Resources of Australia (ERA), the operator of Ranger, and two US utilities, Wisconsin Electric Power Company and Virginia Electric Power Company. The government agreed in principle to further sales by ERA and Queensland Mines Ltd., the operator of Nabarlek, though no new contracts will be approved until after the completion of the ASTEC inquiry. Present negotiating licenses are restricted to the US market.

The government's uranium policy is marked by some encouraging elements, considering the extremism of the most vocal factions of the ALP. It seems possible that the prospects for the future development of uranium properties may improve, particularly if the results of the ASTEC inquiry are favorable, thereby acting to defuse some of the emotionalism within the Party's ranks.

Production Results

Mary Kathleen Uranium Ltd. (MKU), ERA and Queensland Mines all experienced a substantial growth in profits during 1983. Total U_3O_8 production from Australia in 1983 amounted to approximately 8.4 million pounds U_3O_8, a decline of 3.2 million pounds from the 1982 level of 11.6 million pounds. The decline can be attributed to two factors.

1. The Mary Kathleen mine in Queensland ceased production in October 1982. It had contributed approximately 2.0 million pounds of the 1982 total. MKU made shipments from stock during 1983.

2. The Ranger mine stopped producing U_3O_8 at the beginning of December when unions struck over low wages and rent hikes in ERA-owned housing. While causing annual production to fall off, the strike had no effect on deliveries. It ended in mid-January of this year.

Kakadu Park

Among the most promising of Australia's undeveloped uranium properties are two in the Alligator River uranium province in the Northern Territory, Jabiluka and

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Koongarra. (See Report 181 of September 1983 for an overview of Australia's potential as a uranium producing nation.) Koongarra, which Denison Mines acquired in 1980, sits within Phase One of Kakadu National Park, a unique tropical wetland preserve. The previously ruling Liberal Party exempted the Koongarra project area from the strict no-mining conditions applying elsewhere in the Park. In the third quarter of 1983 Denison arrived at a settlement with Aboriginal landowners in the region, clearing a remaining obstacle to project development.

In February 1984 the Labor government implemented Phase Two of Kakadu Park, expanding it to include the region in which Jabiluka is located. The Jabiluka project area has been excluded from the park, thereby safeguarding the rights of the developers under the mining lease granted by the previous government. The park includes the land surface to a depth of 1,000 meters.

Strong support for Jabiluka and Koongarra exists within the Northern Territory. Provincial elections held early in December, just after announcement of the government's uranium policy, returned only 5 ALP candidates out of 25 seats in the Territory's Legisative Assembly. Pancontinental Mining Ltd., which owns 65 percent of Jabiluka, had already entered into commercial agreements selling some of its share of Jabiluka's future output when the government policy was announced. (Getty Oil of the USA, recently acquired by Texaco, owns the remaining 35 percent of Jabiluka, and Texaco has declared its intention to liquidate all non-oil holdings.)

New Uranium Extraction Technique

The Australian Atomic Energy Commission (AAEC) developed a new uranium extraction technique in 1983 that is now used at the Nabarlek mill. The extraction process uses a permonosulphide acid known as Caro's acid in place of pyrolusite as the oxidizing agent to dissolve the 25 percent or so of uranium remaining in the ore after acid treatment. The AAEC reportedly worked on the process with Interox Chemicals Ltd., a European conglomerate with extensive interests in Australia. The Caro's acid process costs less and has associated environmental advantages. Unlike pyrolusite, which yields manganese in the oxidation process, Caro's acid yields only water after leaching.

EUROPE

Introduction

During 1983 nuclear power's share of electricity generating capacity grew steadily in Europe. The public and governmental debate over nuclear power remained very much alive, however, calling into question the long-term strength of national programs committed to the use of nuclear energy for diversification of electricity sources. European nations continued to develop greater autonomy in all aspects of the nuclear fuel cycle.

Belgium

The 900 MWe PWR Tihange Unit 2 began commercial operation during 1983, increasing Belgium's total nuclear generating capacity to 3,450 MWe from five operational units. Construction on two other units is well under way. While consumption of coal and oil in Belgium dropped during 1983, that of nuclear-generated electricity increased by 38 percent. The Belgian government currently is divided over the country's participation in the twin 1300 MWe Chooz PWRs in France.

Early in 1983 Belgium renewed its commitment to domestic reprocessing capability when the government approved reactivation of the Eurochemic reprocessing plant at Mol. The plant should operate at a capacity of 60 tonnes per year by 1990, although the desired capacity is 300 tonnes per year, a level that would cover all domestic needs and foreign business as well. Belgium cooperates closely with France on several aspects of the nuclear fuel cycle, and is a participant in the Super-Phenix fast breeder reactor program. Through its fuel cycle services company Synatom, Belgium owns 11.11 percent of Eurodif.

France

In France, the nation with the largest and fastest-growing nuclear power program in Europe, five 900 MWe PWRs began commercial operation during 1983. By year-end, a total of 35 units were operating commercially, while 27 more were under construction or planned. However, Electricite de France (EDF), the state utility, encountered financial difficulties and the nuclear program became subject to heightened criticism as installed capacity outdistanced electricity demand growth. The French national utility managed its power surplus in 1983 by exporting a record amount of electricity and by scaling back capacity factors of operating units by approximately 5 percent. Meanwhile, associated nuclear industries stepped

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up their activities in international markets during the year. French domestic uranium production from six operating mills totalled approximately 8.5 million pounds U_3O_8. (For more information regarding the nuclear industries in France, see the *Focus* article in this Report.)

Federal Republic of Germany

The Federal Republic of Germany (FRG) proceeded steadily with the convoy program during 1983, while operating units performed well. Two of the country's twelve operational nuclear power units, Grafenrheinfeld and Biblis Unit A, were the only reactors rated at more than 1,000 MWe to appear on *Nuclear Engineering International*'s list of the world's 20 best-performing units. One unit, Kreummel, entered commercial operation in 1983. Activity by intervenors in the FRG, great in recent years, was less marked in 1983, possibly because many intervenors were busy protesting NATO's defense policies. Early in 1984 Isar Unit 2 suffered an irritating setback when a court order forced a halt to construction because of a minor design change. The results of an appeal by the unit's owners are still pending. By reviving controversy about the nuclear industry, the Isar Unit 2 episode could have the effect of rekindling legal obstructionism. (For more information on the FRG's nuclear program, see the *Focus* article in Report 184 of December 1983.)

Switzerland

Switzerland's four operating commercial nuclear units had excellent performance records during 1983, achieving an average load factor of 87.6 percent. The country's fifth unit, Leibstadt, which is located at the confluence of the Rhine and Aare rivers near the border with the FRG, is due to begin commercial operation this year. After several Swiss and German groups alleged that the new unit would be detrimental to the local environment, a joint Swiss-German commission determined that the only significant environmental effect of the Leibstadt plant will be shadows created by the cooling towers.

Switzerland's sixth nuclear reactor is the planned Kaiseraugst unit, around which a heated political debate continues. The future of nuclear power in Switzerland may be decided by the so-called "green" initiative on the subject scheduled to be voted on later this year. Passage of the initiative would bring about a gradual end to the nation's nuclear program. Most of the public opposition to nuclear power is concentrated on the issue of waste disposal. The government is seeking waste burial sites within the country and has faced strong opposition in virtually every canton. A new perspective on the issue has emerged recently as the government of the People's Republic of China has raised the possibility of commercial waste disposal within its borders (a profitable prospect for the PRC).

Italy

The Italian government reaffirmed its intention to reduce reliance on imported oil, in part by increasing nuclear power's share of electricity generating capacity from the current 3 percent to 20 percent in 1995. Laws passed early in 1983 enable the government to preempt local opposition to nuclear plants and offer financial and industrial incentives to localities that choose to accept plant sites. For the state's nuclear power plan to reach fruition, construction will need to begin soon on approximately 9,000 MWe of nuclear capacity.

Italy's nuclear power plan of a decade ago never materialized. One of the effects of its delay was the creation of huge fuel inventories held by the state entities responsible for nuclear fuel procurement. During 1983 those entities were major participants in the nuclear fuel market as they attempted to relieve the burden of unneeded supplies.

Spain

Nuclear generating capacity increased by 19 percent during 1983 as Asco Unit 1 and Almaraz Unit 2 commenced full power operation in August, and Almaraz Unit 1 resumed full power operation after repair of long-standing steam generator problems. There are currently six units in commercial operation and seven under construction. Electricity consumption grew by 3.3 percent during 1983, one of the highest growth rates in Europe. Nevertheless, the Socialist government announced in October a national energy plan that includes drastic cuts in the nation's nuclear generating plan. The plan is scheduled to go to parliament this month (March 1984). If it passes, indefinite deferral of five of the seven reactors under construction can be expected.

The government's plan has aroused criticism from economic planners convinced that demand growth in Spain will continue. The nuclear utilities (and their creditors) responsible for the projects likely to be shelved also have filed vehement protests. Among the reactors likely to be cut from the country's program are the two Lemoniz units located in the Basque country. While the local government claims that the units, one of which is near completion, are essential to reduce the region's almost 100-percent dependence on electricity imports, Basque nationalist opposition is fierce. The government shelved the Lemoniz project temporarily in 1982 after

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terrorists murdered the plant's project manager.

Another controversial plant likely to suffer from the current government policy in Spain is Valdecaballeros. Plant technicians at the site of Valdecaballeros Unit 1 made public allegations late in 1983 that "incredible defects" had been built into the plant. While the operating utility, Hidroelectrica Española, has contested the charges, the allegations may have done irreparable political damage. (For more information about uranium demand and supply in Spain, see the *Focus* article in Report 180 of August 1983.)

Portugal

The Portuguese government issued in 1983 a long-awaited master energy plan that advocates reducing the nation's 83-percent reliance on imported oil. The plan calls for a study of potential reactor sites, reactor types and waste disposal sites, to be completed by mid-1984. Portugal's one operating uranium mine, Urgeirica, produced approximately 300 thousand pounds U_3O_8 in 1983. The country is considering developing other uranium deposits.

United Kingdom

Construction proceeded smoothly in the UK during 1983 on nine advanced gas-cooled reactors (AGRs) due to enter commercial operation by 1991. At year-end four of those units had reached or were near completion; they are scheduled to add 2,500 MWe to nuclear generating capacity in 1984. The dominant public event during the year regarding nuclear power was the Sizewell inquiry, which fell far behind its original schedule. A decision on the Sizewell Unit B-1 PWR does not appear likely until mid-1985 at the earliest. The debate over Sizewell focused on economics during 1983, but the emphasis may shift to reactor type in the coming months as evidence in favor of alternatives to the PWR is presented.

The discovery on nearby beaches of highly radioactive material discharged late in 1983 from British Nuclear Fuels Ltd.'s (BNFL) Sellafield reprocessing plant in northwest England has tainted the public debate over nuclear power in recent weeks. The government has been investigating the incident on both environmental and legal grounds, and has reprimanded BNFL for alleged negligence. Several changes in BNFL's management have ensued. (For information about the UK nuclear power program, see the *Focus* article in Report 185 of January 1984.)

Netherlands

Currently two reactors, having a total generating capacity of approximately 500 MWe, are in commercial operation in the Netherlands. At the end of 1983 a study group appointed by the state to gauge public opinion on alternate energy sources reported it had discovered little public support for nuclear power. While the study's use of non-random sampling and other examples of unscientific methodology rendered its results inconclusive, much political weight has been attached to it. Therefore, the chances for further development of nuclear power appear slim. According to the study, the popular energy scheme in the Netherlands is a combination of reduced growth, solar and wind power, and greater conservation, along with a slowdown in the use of fossil fuels, increased care in the use of natural gas, and extinction of plans for nuclear power.

The Dutch utility PZEM (Provinciale Zeeuwse Energie Maatschappij), operator of the 445-MWe Borssele unit, signed a long-term SWU contract with Urenco late in 1983. The Dutch company Ultra-Centrifuge Nederland (UCN) owns 33.3 percent of Urenco (BNFL of the United Kingdom and Uranit of the FRG also own one-third shares of the centrifuge enrichment company), and one of Urenco's two plants is located at Almelo in the Netherlands (the other is in Capenhurst, UK).

Sweden

The ten operating nuclear units in Sweden, which provide approximately 40 percent of the electricity consumed in the country each day, performed smoothly during 1983. One new reactor, the Swedish State Power Board's (SSPB) Ringhals Unit 4, began commercial operation in November, and the last two units in the nation's twelve-unit nuclear program neared completion. A 1980 national referendum called for the phasing out of all nuclear plants in Sweden by the year 2010. Laws also require the nuclear utilities, SSPB, OKG (Oskarshamnsverkets Kraftgrupp) and Sydkraft, to demonstrate safe handling of spent fuel in order to operate plants commercially.

A spent-fuel storage facility under construction at OKG's Oskarshamn plant site will serve all Swedish reactors when it enters service in 1985. SSPB, OKG and Sydkraft all terminated long-term SWU contracts with DOE in 1983 and purchased replacement SWUs from the Italian state utility ENEL (Ente Nationale per L'Energie Electrica). SSPB and Sydkraft began receiving deliveries totalling approximately 1 million pounds annually from

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Saskatchewan Mining Development Corporation (SMDC) of Canada in 1983.

On December 27, a nationwide electricity blackout occurred in Sweden when a fire at a small regional transformer station triggered automatic shutdowns in 7 out of 8 nuclear reactors that were operating at the time. Most of the country was without electricity for several hours, and all of the nation's emergency generating sources had to be turned on.

Finland

During 1983 nuclear units continued to perform well in Finland, where TVO (Teollisuuden Voima Osakeyhtio) operates two 660-MWe units, and IVO (Imatran Voima Oy) operates two Soviet-made 440-MWe units. Those units provide close to half of the nation's electricity requirements. TVO announced early in the year that a domestic interim storage facility for spent fuel will be operating in 1988. The utility buys most of its uranium from one Canadian producer and one Australian producer, and has contracts with Techsnabexport of the Soviet Union for enrichment services. The Soviet Union supplies all of IVO's uranium and fuel cycle needs.

1983 US CONSUMPTION VS. US PRODUCTION

Analysis

Nuexco's current estimate of 1983 uranium consumption for use in US commercial nuclear power plants amounts to 30.5 million pounds. Comparing that consumption level to the US Department of Energy (DOE) production estimate of 21.2 million pounds yields a domestic shortfall of 9.3 million pounds. Although Nuexco estimates that imports of uranium into the USA totaled 12.3 million pounds, US exports of 6.0 million pounds U_3O_8 reduced net imports to 6.3 million pounds U_3O_8. The balance of the shortfall was supplied from inventories. The foregoing analysis is summarized in Table 3.

Derivation of Consumption Estimate

The term U_3O_8 *consumption* refers to uranium that is processed, fabricated and installed for the operation of commercial nuclear power units. Unless Nuexco has specific information indicating otherwise, the analysis assumes that U_3O_8 destined for use in initial cores is consumed, and therefore added to the consumption total, 24 months before a unit's scheduled commerical operation date (COD). The analysis assumes that U_3O_8 for each unit's first reload is consumed 18 months before the scheduled reload date; similarly, the analysis assumes a 12-month lead time for consumption of U_3O_8 associated with all subsequent reloads.

Nuexco's current estimate of US uranium consumption represents an upward revision of 1.6 million pounds as compared to the estimate of 28.9 million pounds published in Report 182 of October 1983. The methodology for arriving at the October figure, explained in detail in that Report, involves several reactor-specific variables, including thermal power, capacity factor and fuel enrichment levels. Tails assays are assumed to be 0.25 weight-percent U_{235}. The 1.6-million-pound increase since October reflects adjustments in the timing of U_3O_8 consumption associated with first cores.

Table 3

1983 US U_3O_8 CONSUMPTION VS. PRODUCTION
(millions of pounds U_3O_8 equivalent)

Consumption[1]	30.5
Production[2]	21.2
Consumption — Production	9.3
Imports[3]	12.3
Exports[3]	6.0
Net Imports	6.3
Net Reduction of Inventories	3.0

[1]Nuexco estimate.
[2]USDOE estimate.
[3]Nuexco estimate.

Discussion

Despite the gap between domestic production and consumption, US utilities imported directly from non-US sellers less than one-sixth the amount of total consumption. Of the 12.3 million pounds U_3O_8 imported to the USA in 1983, only 5.1 million pounds went directly to utilities. Most uranium imported was purchased by US *producers* interested in acquiring U_3O_8 or UF_6 at low prices and using it to fulfill existing contract obligations.

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Nuexco projects US uranium production to decline from the 1983 level by approximately 5 million pounds in 1984, while consumption should rise slightly, thereby increasing the gap between domestic production and consumption. As in 1983, the difference should not cause alarm among US utilities. In general, four factors are likely to increase utilities' feelings of security regarding fuel supply during 1984.

1. US utilities are generally well-supplied for the next few years, and given the rate of delays and cancellations to reactor operation schedules, domestic utility inventories will continue to represent several years' worth of forward consumption.

2. The presence of a large active supply of uranium from aggressive sellers outside the USA as well as within the USA is keeping downward pressure on prices. That pressure appears likely to persist for the near future.

3. Uranium production in almost all producer countries that are traditional trading partners of the USA continues to increase or remain steady. The mining of new high-grade deposits is bringing into the market large quantities of uranium that can be sold economically at very low prices. While there will always be a certain preference by US utilities for US-origin material, the internationalization of the uranium market gradually has reduced US utilities' sensitivity to national origin.

4. The US production sector is highly resilient in the sense that numerous US companies have experience in the uranium field and, in the event of domestic need of sufficient urgency, could enter the field with relative quickness.

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FRANCE

Introduction

Nuclear power in France has achieved the prominence denied to it elsewhere in the world. Commercial nuclear power stations' share of electricity generating capacity has grown remarkably, from less than 2 percent in 1977 to approximately 50 percent as of the end of 1983. Other sectors of the nuclear fuel cycle have experienced notable gains as well. The oil price shock of the early 1970s promoted France's nuclear industries, as the state utility, Electricite de France (EDF), set a course for aggressive development of alternate electricity sources. EDF currently generates more nuclear electricity than any other utility in the Western World.

Electricity demand growth rates in France have declined during the past few years, however, and EDF's nuclear power program has been criticized as too ambitious. During 1983 the government reduced the official plan for nuclear generating capacity in 1990 from 66 GWe to 56 GWe. The utility has a rapidly growing surplus of generating capacity. French companies involved in the front end of the fuel cycle have begun to compete more aggressively in international markets as the outlook for the domestic nuclear program has begun to change.

Nuclear Power Plant Construction

Thirty-five nuclear units (counting the 233 MWe Phenix fast breeder reactor) are currently in commercial operation in France, representing total nuclear generating capacity of approximately 26 GWe (Table 4). Twenty-three more units are under construction and four are on order; those units are scheduled to add a total of approximately 31.4 GWe by the early 1990s (Table 5). Figure 1 shows the locations of nuclear generating stations in France.

With the exception of Chooz Unit A, a 310-MWe PWR completed in 1967, all of the units in commercial operation in France through 1972 were gas-cooled reactors (GCRs) based on technology developed in the United Kingdom. The experimental Phenix fast breeder reactor began operation at the end of 1973. Since then the commercial nuclear power program has been dominated by PWR technology purchased from Westinghouse of the USA by the French manufacturer Framatome.

The first phase of the PWR program began in 1970 with a plan for construction of six 900-MWe units by the end of the decade, two at the Fessenheim site in Alsace and four at the existing Bugey site east of Lyon. The 1970 plan was superseded quickly in 1973–74, however, as high oil prices forced French economic planners to reevaluate the country's heavy dependence on imported oil. Based on high forecasts of electricity demand, EDF began to place orders for a line of eighteen 900-MWe PWRs. Fourteen of those units started commercial operation during 1980 and 1981. Ten more units, comprising the second line of 900-MWe PWRs, were ordered or planned in 1976. Because of plant standardization, multiple yearly orders, and an assertive national attitude, reactor construction time averaged 60 months by the early 1980s.

Annual orders for a new line of 1300-MWe PWRs began in 1977 in keeping with continued projections of rapid growth in electricity demand. To date none of the larger PWRs has begun commercial operation, but the Paluel Units 1 and 2 are scheduled for commercial operation in the first half of this year. The government approved a second generation of eight more 1300-MWe PWRs in 1979, and during 1983 two more units were ordered, Penly Unit 1 and Chooz Unit B-1. A total of nineteen 1300-MWe PWRs are now under construction or on order.

The government of France continues to support its aggressive nuclear power plant construction program primarily for three reasons.

1. Greater emphasis on nuclear energy has reduced the need to purchase oil at higher dollar prices, and has enabled France to sell oil stockpiles, thereby easing the balance of payments deficit caused by the currently devalued franc.

2. Nuclear-related industries employ a substantial workforce, and the current economic climate in France has made those jobs especially valuable.

3. Many economic planners contend that the creation of a large electrical power infrastructure is a prerequisite for long-term economic growth.

EDF's Current Overcapacity

Although arguments in favor of nuclear power development are generally accepted within France, EDF's large and growing surplus of power capacity has stimulated a serious reassessment of domestic energy policy. In mid-1983 primary energy consumption had declined by 4.6 percent from the previous year, reaching a level equal to that of 1975. France's established nuclear plant construction program is based on sustained electricity demand *growth* at the rate of 2.5 percent per year.

The utility's problems have been magnified by commitments to coal and natural gas as well as to nuclear power. Actual coal usage fell during 1983 as older coal-fired sta-

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Figure 1

NUCLEAR PLANT SITES AND URANIUM PRODUCTION CENTERS IN FRANCE

LEGEND

- ⊠ U_3O_8 Production Center
- ○ Nuclear Plant Site
- ○ Fuel Cycle Facility
- ▲ GCR
- ■ 900-MWe PWR in Commercial Operation
- □ 900-MWe PWR Under Construction
- ▢ 1300-MWe PWR Under Construction
- ◆ FBR in Commercial Operation
- ◇ FBR Under Construction

[1]Chooz Unit A is a 300-MWe PWR.
[2]Paluel Unit 1 begins commercial operation in March 1984.

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Table 4

NUCLEAR POWER UNITS IN FRANCE IN COMMERCIAL OPERATION

Unit	MWe (Net)	Type	COD[1]
Marcoule G-3	40	GCR	May 1960
Chinon 2	210	GCR	Feb 1965
Chooz A	310	PWR	Apr 1967
Monts d'Arree	70	GCHWR[2]	Jul 1967
Chinon 3	400	GCR	Aug 1967
St. Laurent des Eaux 1	460	GCR	Mar 1969
St. Laurent des Eaux 2	515	GCR	Aug 1971
Bugey 1	540	GCR	Apr 1972
Phenix	233	FBR	Dec 1973
Fessenheim 1	880	PWR	Dec 1977
Fessenheim 2	880	PWR	Mar 1978
Bugey 2	920	PWR	Feb 1979
Bugey 3	920	PWR	Feb 1979
Bugey 4	900	PWR	Jun 1979
Bugey 5	900	PWR	Jan 1980
Dampierre 1	890	PWR	Sep 1980
Gravelines B-1	910	PWR	Nov 1980
Gravelines B-2	910	PWR	Dec 1980
Tricastin 1	915	PWR	Dec 1980
Tricastin 2	915	PWR	Dec 1980
Dampierre 2	890	PWR	Feb 1981
Dampierre 3	890	PWR	May 1981
Tricastin 3	915	PWR	May 1981
Gravelines B-3	910	PWR	Jun 1981
Gravelines B-4	910	PWR	Oct 1981
Dampierre 4	890	PWR	Nov 1981
Tricastin 4	915	PWR	Nov 1981
Blayais 1	910	PWR	Dec 1981
Blayais 2	910	PWR	Feb 1983
St. Laurent des Eaux B-2	880	PWR	Jun 1983
Cruas 1	880	PWR	Aug 1983
Blayais 4	910	PWR	Sep 1983
St. Laurent des Eaux B-1	880	PWR	Oct 1983
Chinon B-1	870	PWR	Oct 1983
Blayais 3	910	PWR	Nov 1983
TOTAL MWe	26,188		

[1]Commercial operation date. Information from *Nuclear News* World List of Nuclear Power Plants and utility publications.
[2]GCHWR = Gas-cooled, heavy-water moderated reactor.

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Table 5

NUCLEAR POWER UNITS IN FRANCE UNDER CONSTRUCTION AND ON ORDER

Unit	MWe (Net)	Type	Percent Complete	COD[1]
Paluel 1	1290	PWR	100	Mar 1984
Cruas 3	880	PWR	99	Apr 1984
Gravelines C-5	910	PWR	98	Jul 1984
Paluel 2	1290	PWR	98	Jul 1984
Cruas 4	880	PWR	98	Aug 1984
Cruas 2	880	PWR	95	Nov 1984
Chinon B-2	870	PWR	95	Nov 1984
Paluel 3	1290	PWR	80	May 1985
St. Alban 1	1300	PWR	80	Jun 1985
Flamanville 1	1290	PWR	75	Sep 1985
Gravelines C-6	910	PWR	70	Nov 1985
Paluel 4	1290	PWR	55	Mar 1986
St. Alban 2	1300	PWR	55	May 1986
Cattenom 1	1265	PWR	55	Jun 1986
Flamanville 2	1290	PWR	50	Aug 1986
Chinon B-3	870	PWR	35	Feb 1987
Cattenom 2	1265	PWR	40	May 1987
Belleville 1	1275	PWR	35	Sep 1987
Chinon B-4	870	PWR	25	Nov 1987
Nogent sur-Seine 1	1275	PWR	25	Apr 1988
Belleville 2	1275	PWR	20	Aug 1988
Nogent sur-Seine 2	1275	PWR	15	Jan 1989
Cattenom 3	1265	PWR	5	Apr 1989
Penly 1	1290	PWR	0	Oct 1989
Golfech 1	1275	PWR	0	Jan 1990
Chooz B-1	1270	PWR	0	indefinite
Chooz B-2	1270	PWR	0	indefinite
TOTAL MWe	31,410			

[1]Commercial operation date. Information from *Nuclear News* World List of Nuclear Power Plants and utility publications.

tions were removed from the grid, but new coal-fired plants are being built to replace the old ones. The French government is reluctant to make big cuts to the coal-generating program because of high unemployment in the nation's coal-mining regions. Agreements to purchase natural gas from the Netherlands, Norway, the USSR and Algeria add to the energy surplus.

EDF has taken a number of steps to ease its over-capacity problems.

1. It has reduced new nuclear plant orders to approximately two per year (with one export sale every two years), a level that the government considers to be the minimum rate necessary to maintain a viable French reactor industry.

2. It has extended the average construction time per nuclear unit from 60 months to 78 months to slow the pace of new units reaching completion.

3. It has cut back an average of 5 percent on operating plants' capacity factors.

4. It has marketed electricity to neighboring countries aggressively, exporting a record amount in 1983.

5. It has attempted to capture a larger share of industrial power demand within France.

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Uranium Industry Structure

Four large organizations dominate French uranium interests: the state Commissariat a l'Energie Atomique (CEA); Compagnie Francaise des Petroles (CFP), of which the state owns 35 percent; the state-owned metals company Pechiney; and Imetal, France's largest producer of non-ferrous metals. CEA owns half of Framatome and 100 percent of Cogema (Compagnie General des Matieres Nucleaires), which is the most active company in the nuclear fuel cycle in France. CFP owns Total Compagnie Miniere (Total), which controls Compagnie Miniere Dong-Trieu (CMDT) and all of the interests that formerly belonged to Minatome. Pechiney owns shares in Amok in Canada, Comuf in Gabon and Somair in Nigeria, and interests in several other companies related to the fuel cycle. Imetal owns Compagnie Francaise Mokta, which has both domestic and offshore uranium interests. (Cogema owns 12.14 percent of Imetal and presumably influences the activities of Mokta.) Figure 2 diagrams some of the ownership relations of these organizations.

CEA enlarged its share of Framatome to one-half recently after making a 20-percent acquisition using commercial profits. (EDF had competed to buy the share.) The other 50 percent of Framatome is controlled by Creusot Loire. Framatome has become one of the leading reactor manufacturers in the world. The advantages to CEA of ownership in Framatome include the ability to combine the manufacturer's interests with those of Cogema. Framatome and Cogema are working together on the sale of reactors to several developing countries, including China, Egypt, South Korea, and Taiwan. The combined effort enables the French to offer attractive packages that include all fuel requirements.

Cogema has extensive interests in uranium properties, owns 39 percent of the French convertor Comurhex and 61.14 percent of Eurodif[1], has ownership interests in fuel fabrication companies, and operates the country's Marcoule and La Hague reprocessing plants. In France, its wholly-owned subsidiary SIMO (Societe Industrielle des Minerais de L'Ouest) operates three of the country's six active uranium mills: L'Ecarpiere, Bessines and Lodeve. Cogema also purchases all of the output from Langogne, which is operated by Mokta. The company owns shares of uranium operations in the former French colonies Niger and Gabon (Figure 2) and purchases a large percentage of the output from those countries.

In Canada Cogema owns 30 percent of Amok (along with Pechiney (45 percent) and Mokta (25 percent)), and takes 100 percent of Amok's 80-percent share of Cluff Lake production. Cogema is also the parent of SERU Nucleaire Limitee (Societe d'Etudes et de Recherches d'Uranium), which has a 33.625 percent stake in the Waterbury Joint Venture, owner of the rich Cigar Lake deposit in northern Saskatchewan. Cogema's US branch, Cogema Inc., acquired 80 percent of Pathfinder Mines from General Electric in 1981. Pathfinder produces uranium at Gas Hills and Shirley Basin in Wyoming.

From these sources and others Cogema accounts for a total of approximately 20 percent of Free World U_3O_8 production annually. The company supplies EDF with almost all of the utility's annual deliveries. Much of the remainder of Cogema's production share supplies contracts with non-French customers negotiated by Cogema and Uranex, Cogema's predecessor as CEA's uranium marketing agency.

Like Cogema, Total Compagnie Miniere has diverse and widespread uranium interests. Total acquired the two major private French uranium producers, Minatome and Dong-Trieu, late in 1982. Among the interests that Total assumed upon acquisition of Minatome were 10 percent ownership of Rossing in Namibia, 94-percent ownership of SCUMRA (Societe Centrale de l'Uranium et des Minerais et Metaux Radioactifs), the operator of St. Pierre in France, and full ownership of the Ben Lomond uranium deposit in Queensland, Australia. Dong-Trieu is the operator of the Mailhac mill in France.

Uranium Pechiney, the branch of Pechiney responsible for nuclear-related businesses, holds a 51-percent share of Comurhex, a 27-percent share of Transnucleaire and shares in the fuel fabricators FBFC (Societe Franco-Belge de Fabrication de Combustible) and CFC (Cogema Frar. atome Combustible) in addition to its interests in Amok, Comuf and Somair. Mokta operates the domestic production facility at Langogne, and owns 39 percent of Comuf and 19.38 percent of Somair in addition to its 25-percent share in Amok.

Output from domestic mills totalled approximately 8.5 million pounds U_3O_8 in 1983. The six operating uranium mills process ore mined from scattered orebodies of varying sizes located in Brittany, the Vendee, the Massif Central and Languedoc. Average grade ranges from 0.10-0.20 percent U_3O_8. Table 6 lists the six operating mills, their operators and estimated 1983 U_3O_8 production.

[1] Assumes Cogema controls share originally belonging to Iran Atomic Energy Organization.

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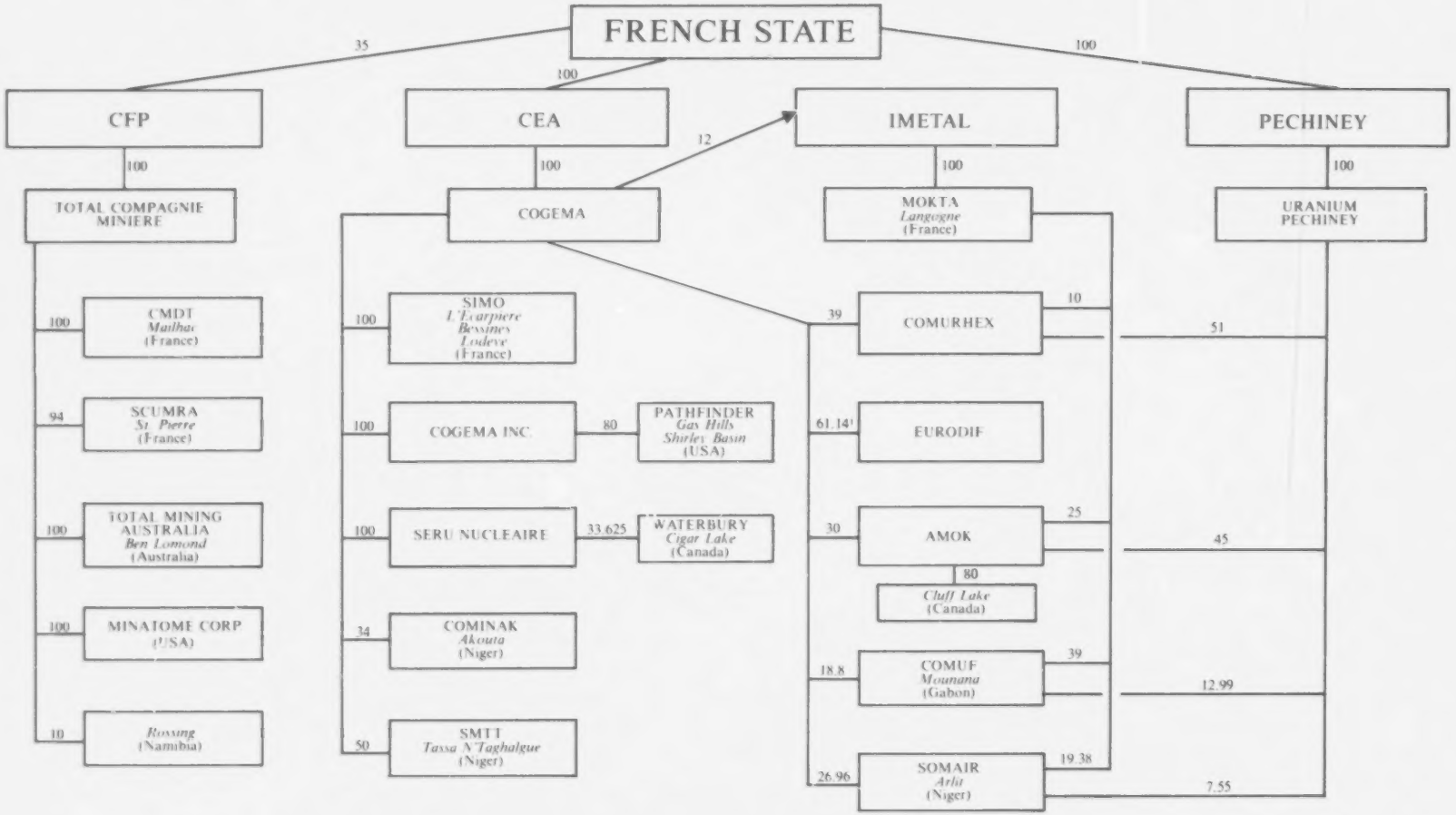
Figure 2

FRENCH OWNERSHIP INTERESTS IN URANIUM PROJECTS



LEGEND

CEA	—Commissariat a l'Energie Atomique	SCUMRA	—Societe Centrale de l'Uranium et des Minerais et Metaux Radioactifs
CFP	—Compagnie Francaise des Petroles		
CMDT	—Compagnie Miniere Dong-Trieu	SERU	—Societe d'Etudes et de Recherches d'Uranium
COGEMA	—Compagnie General des Matieres Nucleaires	SIMO	—Societe Industrielle des Minerais de L'Ouest
COMINAK	—Compagnie Miniere d'Akouta	SMTT	—Societe Miniere de Tassa N'Taghalque
MOKTA	—Compagnie Francaise de Mokta	SOMAIR	—Societe des Mines de L'Air

[1]Assumes Cogema controls share originally belonging to Iran Atomic Energy Organization

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Table 6

OPERATING URANIUM MILLS IN FRANCE

Mill	Operator	Estimated 1983 Output (million pounds U_3O_8)
L'Ecarpiere	SIMO[1]	1.4
Bessines	SIMO	2.7
Lodeve[2]	SIMO	2.7
Langogne	Mokta	0.5
Mailhac	Dong-Trieu	1.0
St. Pierre	SCUMRA[3]	0.2
Total 1983 Production		8.5

[1]SIMO = Societe Industrielle des Minerais de L'Ouest.
[2]See the *Raw Materials* section of Report 182 for a description of the Lodeve project.
[3]SCUMRA = Societe Centrale de l'Uranium et des Minerais et Metaux Radioactifs.

Table 7

EURODIF OWNERSHIP

Entity	Country	Percent Share
Cogema	France	61.14[1]
Synatom	Belgium	11.10
Enusa[2]	Spain	11.10
CNEN[3]	Italy	8.33
Agip Uranio	Italy	8.33

[1]Assumes Cogema controls share originally belonging to Iran Atomic Energy Organization.
[2]Enusa = Empresa Nacional del Uranio SA.
[3]CNEN = Comitat Nazionale per L'Energia Nucleare.

Fuel Cycle Services

Comurhex, of which Pechiney owns 51 percent, Cogema 39 percent and Mokta 10 percent, supplies virtually all of EDF's conversion needs. Plant facilities are located in Southern France at two sites, Malvesi and Pierrelatte. The Malvesi plant converts concentrates to UF_4, which is shipped to Pierrelatte for conversion to UF_6. Total annual capacity is approximately 12,000 MTU.

EDF has two Requirements contracts and one AFC contract with DOE for deliveries through FY86, and has sold most of its excess DOE commitments in the secondary market. Future purchases from DOE are unlikely, as most of the national utility's enrichment needs are supplied by Eurodif. Eurodif operates at Tricastin in Southern France a gaseous diffusion enrichment plant having a production capacity of 11.1 million SWUs per year. Table 7 shows the ownership shares of Eurodif.

Summary

Since the early 1970s, France has moved to the forefront in all industry sectors associated with nuclear power generation. It is the only nation having an ambitious nuclear power program that has adhered relatively closely to its plans of the past decade. The state utility, EDF, generates more electricity from nuclear power plants than any other utility in the industrialized West. Framatome, the country's reactor manufacturer, is one of the most active in the world. A longstanding commitment to advanced technology has given rise to the 1200-MWe Super-Phenix fast breeder reactor now under construction at Creys Malville.

The declining rates of domestic electricity demand growth in recent years have caused an electricity generating capacity surplus, and have led the state to reduce its long-term nuclear generating plan. To redress the slack in demand resulting from reductions to the domestic program, the French supply sectors have taken bold steps to export power, technology, fuel cycle services and material. French companies presently supply approximately 20 percent of the natural uranium market, 30 percent of the conversion market and almost 25 percent of the enrichment market.

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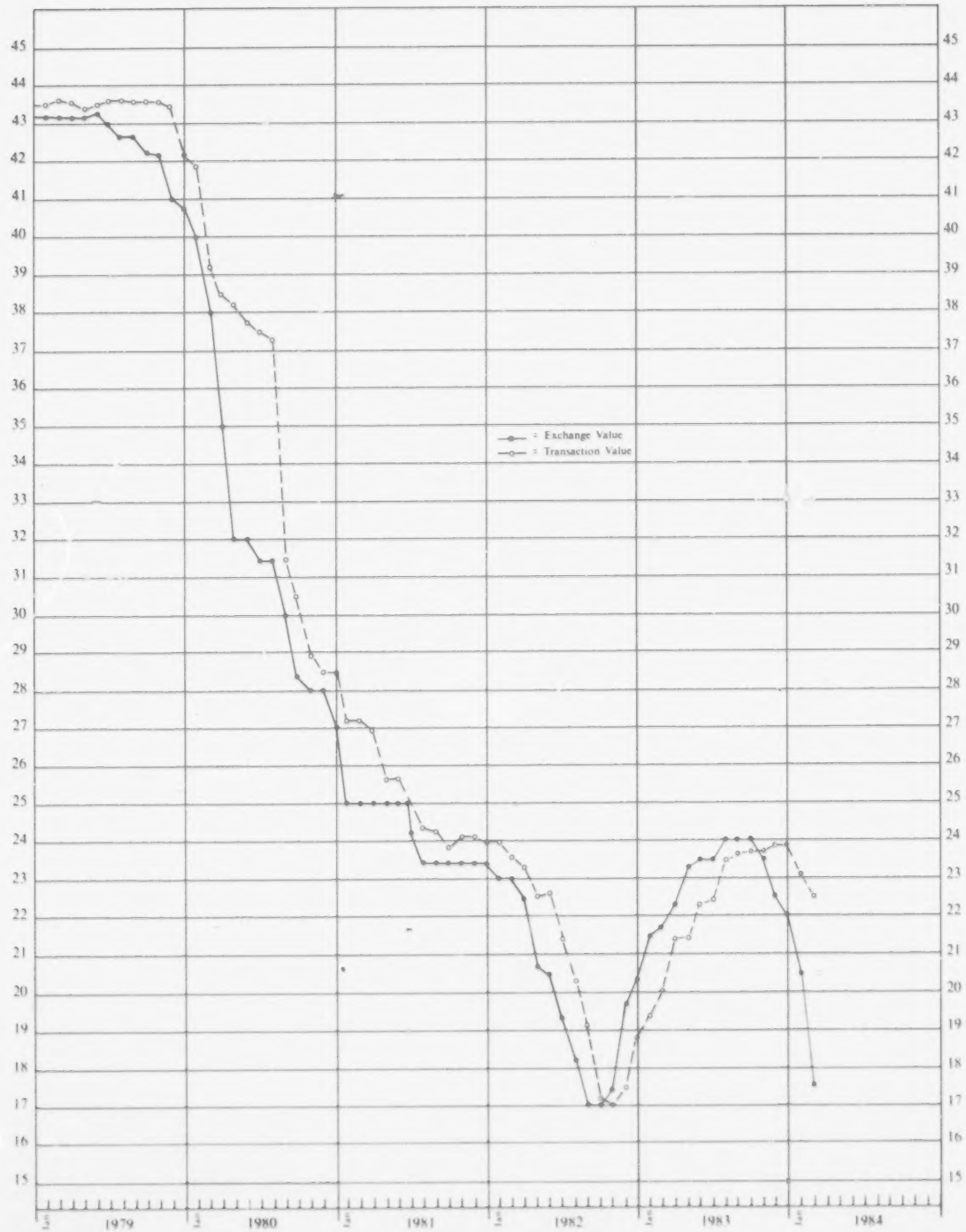
EXCHANGE AND TRANSACTION VALUES
SINCE JANUARY 1979
Determined as of the last day of the month indicated



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HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	32.50	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22 50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	**17.50**										

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	**22.50**										

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	**0.30**										

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AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups[1] (1969=100)	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage Earners, Weekly Rates[2] (1976=100)
1972 Avg.	105.6	71.3
1973 Avg.	124.4	79.0
1974 Avg.	141.9	108.1
1975 Avg.	150.4	132.6
1976 Avg.	168.4	160.9
1977 Avg.	192.0	179.0
1978 Avg.[3] [4]	198.5	190.0
1979 Avg.	248.8	127.9
1980 Avg.	321.8	140.8
1981 Avg.	355.3	154.1
1982 Avg.[5]	368.6	174.9
1983 Avg.	—	181.7
Nov 1982	375.9	178.5
Dec 1982	374.9	179.5
Jan 1983	385.7	179.6
Feb 1983	387.5	179.8
Mar 1983	397.4	179.7
Apr 1983	407.3	180.0
May 1983	414.8	180.1
Jun 1983	415.6	180.2
Jul 1983	408.4	179.9
Aug 1983	403.1	179.8
Sep 1983	403.1	179.7
Oct 1983	397.6P	187.5R
Nov 1983	—	187.4R
Dec 1983	—	187.2P

P = Preliminary R = Revised since last month

[1]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[2]Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[3]Monthly data for 1970-78 appear on pages 4.7 and 4.8 of Report 138.
[4]Annual averages prior to 1979 reflect index base no longer in use.
[5]Monthly data for 1979-82 appear on page 35 of Report 184.

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GOVERNMENT STATISTICS

CANADA

	Industry Selling Price Index: Manufacturing[1] (1971=100)	Wage-earner Data: Average Hourly Earnings (C$)[2]						
		Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Primary Metal Industries Non-ferrous[4] (SIC 296)	(SIC 296-298)	(SIC 298)	Chemicals and Chemical Products[5] (SIC 370-379)
1979 Avg.[6]	217.9	—	9.60	9.66	—	7.35	—	7.67
1980 Avg.	247.2	—	10.59	10.80	—	8.05	—	8.50
1981 Avg.	288.7	—	12.02	12.23	—	9.03	—	9.53
1982 Avg.[7]	288.8	—	13.74	13.92	—	9.98	—	10.63
1983 Avg.	298.7	—	14.65	14.29	—	—	—	11.18
Oct 1982	292.1	—	13.83	13.89	—	10.18	—	10.86
Nov 1982	291.3	—	14.42	14.28	—	10.43	—	10.90
Dec 1982	292.3	—	14.54	14.32	—	10.55	—	11.06
Jan 1983	292.7	—	14.36	14.35	—	10.72	—	11.06
Feb 1983	293.5	—	14.24	14.28	—	10.74	—	11.06
Mar 1983[8]	295.2	16.79	14.84	14.48	—	10.93	—	11.21
Apr 1983	297.1	16.83	14.40	14.13	11.57	—	10.10	11.02
May 1983	298.5	17.02	14.50	14.10	11.39	—	9.82	10.97
Jun 1983	299.3	17.02	14.60	14.07	11.33	—	9.84	11.05
Jul 1983	300.4	16.48	14.35	13.93	11.70	—	9.83	11.04
Aug 1983	301.2	16.93	14.36	13.89	11.82	—	10.08	11.19
Sep 1983	301.0	17.66	14.90	14.41	11.99	—	10.32R	11.29
Oct 1983	301.5	17.73	15.27	14.65	11.76	—	10.03	11.30
Nov 1983	301.7R	17.82R	15.29R	14.67R	11.78R	—	10.62R	11.38R
Dec 1983	302.6R	—	14.71P	14.46P	11.79P	—	10.53P	11.55P
Jan 1984	304.5P	—	—	—	—	—	—	—

P = Preliminary R = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision.

[2]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002).

[3]Reports 175 through 185 list this series title incorrectly as "Metal Mining, Including Milling (SIC 050-099)".

[4]Beginning with the April 1983 figure, Primary Metal Industries, non-ferrous is split into SIC 296 and SIC 298.

[5]Chemical and Chemical Products prior to April 1983 was SIC 370-379. The new series is from a new survey which includes all companies and is based on a 1970 classification. The old survey only included companies of 20 employees or more.

[6]Monthly ISPI for 1977 and 1978 appear on page 4.10 of Report 138, and monthly wage-earner data for 1973-78 appear on page 4.11 of Report 138.

[7]Monthly data for 1979-1982 appear on page 37 of Report 184. On that page, the wage earner index entitled "Metal Mining, Including Milling (SIC 050-099)" should read Total Mining (SIC 051-099)".

[8]Beginning with the April 1983 figure, Wage Earner Data are based on a census of all companies employing 200 or more wage earners, *plus* a random survey of companies employing fewer than 200 wage earners. Prior to April 1983 only companies employing fewer than 200 wage earners are included in the Wage Earner Data.

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REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100)	Producer Price Index All Groups[4] (1975=100)[3]	Total Employment in Mining and Quarrying (Code 35)[5]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[5]
1972 Avg.	8.79	113.3	63.9	623,067	443,933
1973 Avg.	10.51	124.1	72.3	684,743	572,133
1974 Avg.	13.18	138.5	85.3	674,140	761,596
1975 Avg.	16.71	157.2	100.0	639,473	1,003,617
1976 Avg.	19.30	174.7	115.1	671,240	1,212,983
1977 Avg.	23.87	194.4	130.0	712,006	1,420,670
1978 Avg.	27.14	137.2	142.7	664,571	1,537,169
1979 Avg.[6]	30.18	155.3	164.5	692,209	1,830,632
1980 Avg.[7]	35.53	176.7	192.1	714,379	2,279,615
1981 Avg.	41.89	206.5	218.3	728,506	2,820,505
1982 Avg.[8]	47.25	233.5	248.7	707,552	3,246,071
1983 Avg.	51.87	262.2	274.8	—	—
Nov 1982	—	245.4	262.5	707,966	287,699
Dec 1982	49.62	246.2	263.0	683,982	288,019
Jan 1983	—	249.0	264.9	688,030	289,075
Feb 1983	—	253.1	267.4	697,089	281,413
Mar 1983	50.35	255.9	269.1	695,976	290,586
Apr 1983	—	257.8	270.9	697,158	286,708
May 1983	—	259.7	274.1	701,712	295,701
Jun 1983	50.51	260.8	273.1	706,933	300,177
Jul 1983	—	262.5	273.7	704,202	314,566
Aug 1983	—	265.6	278.9	698,984	311,789
Sep 1983	52.92	267.3	279.4	696,435	312,264
Oct 1983	—	270.0	281.0	693,225	311,418
Nov 1983	—	271.4	281.6	688,459	317,485
Dec 1983	53.70	273.2	283.7	—	—

[1]Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly. The tonnage-weight index of average working costs per metric ton of gold ore milled for 1983 follows. (Base: March quarter 1982 = 100). See page 16 of Report 178 for the description and calculation of index, and page 24 of Report 178 for figures for 1982.

1983:	January-March	111.2
	April-June	111.9
	July-September	117.4
	October-December	119.6

[2]Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."
[3]For annual averages prior to 1978, April 1970 = 100.
[4]Previously known as the Wholesale Price Index, now the Producer Price Index. The computation remains the same.
[5]Bulletin of Statistics, Department of Statistics, Pretoria.
[6]Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Report 140.
[7]Monthly data for Codes 35 and 40, 1977-1980, appear on page 28 of Report 157.
[8]Monthly data for 1979-82 appear on page 39 of Report 184.

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GOVERNMENT STATISTICS

UNITED STATES

	Producer Price Index[1] Industrial Commodities (1967=100)	Producer Price Index[1] All Commodities (1967=100)	Consumer Price Index[2] (1967=100)	GNP Implicit Price Deflator[3] (1972=100)	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4] Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1972 Avg.	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
1973 Avg.	125.9	134.7	133.1	105.75	4.84	4.98	4.51	3.91
1974 Avg.	153.8	160.1	147.7	115.08	5.44	5.63	4.88	4.21
1975 Avg.	171.5	174.9	161.2	125.79	6.13	6.24	5.39	4.64
1976 Avg.	182.4	183.0	170.5	132.34	6.76	6.87	5.91	4.96
1977 Avg.	195.1	194.2	181.5	140.05	7.28	7.67	6.43	5.39
1978 Avg.[5]	209.4	209.3	195.4	150.42	8.23	8.56	7.02	5.82
1979 Avg.	236.5	235.6	217.4	163.42	9.27	9.50	7.60	6.32
1980 Avg.	274.8	268.8	246.8	178.64	10.26	10.63	8.30	6.94
1981 Avg.	304.1	293.4	272.4	195.51	11.55	11.98	9.12	7.62
1982 Avg.[6]	312.3	299.3	289.1	207.15	12.33	12.94	9.96	8.21
1983 Avg.	315.8	303.1	298.4	215.62R	12.67	13.44	10.58	8.66
Nov 1982	315.0	300.3	293.6	—	12.53	13.22	10.26	8.45
Dec 1982	315.2	300.7	292.4	210.00	12.53	13.05	10.32	8.51
Jan 1983	313.9	299.9	293.1	—	12.63	13.33	10.34	8.53
Feb 1983	313.9	300.9	293.2	—	12.66	13.29	10.41	8.56
Mar 1983	313.5	300.6	293.4	212.83	12.48	13.35	10.39	8.60
Apr 1983	312.4	300.6	295.5	—	12.67	13.34	10.43	8.60
May 1983	313.6	301.5	297.1	—	12.55	13.62	10.50	8.60
Jun 1983	315.3	302.4	298.1	214.55	12.66	13.38	10.52	8.63
Jul 1983	316.5	303.2	299.3	—	12.68	13.56	10.58	8.69
Aug 1983	317.3	304.7	300.3	—	12.63	13.46	10.61	8.64
Sep 1983	317.1R	305.3	301.8	216.44	12.71	13.47	10.69	8.75
Oct 1983	318.7	306.3	302.6	—	12.78	13.56	10.78	8.73
Nov 1983	318.3	305.6	303.1	—	12.72R	13.56R	10.86R	8.78R
Dec 1983	318.4	306.0	303.5	218.67R	12.85P	13.38P	10.89R	8.85
Jan 1984	319.2	308.1P	305.2P	—	—	—	10.90P	8.88P

P = Preliminary R = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.
[2]US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items.
[3]US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.
[4]US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." 2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.
[5]Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Report 154.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.
[6]Monthly data 1979-1982 for all listed indices appear on page 41 of Report 184.

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